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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,977

09/05/2006

Kaneo Chiba

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9338

36716

7590

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EXAMINER

SCHLIENTZ, LEAH H

ART UNIT

PAPER NUMBER

1618

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,977	Applicant(s) CHIBA ET AL.	
	Examiner Leah Schlientz	Art Unit 1618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 October 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 6-8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 9 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Acknowledgement of Receipt

Applicant's Response, filed 10/6/2010, in reply to the Office Action mailed 7/6/2010, is acknowledged and has been entered. Claim 1 has been amended. Claim 10 is newly added. Claims 1-10 are pending, of which claims 6-8 are withdrawn from consideration at this time as being drawn to a non-elected invention. Claims 1-5, 9 and 10 are readable upon the elected invention and are examined herein on the merits for patentability.

Response to Arguments

Any rejection not reiterated herein has being overcome by amendment.

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection, necessitated by claim amendment.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

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F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-5 and 9 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 3-13 of copending Application No. 10/591,979, for reasons set forth in the previous Office Action.

Claims 1-5 and 9 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 3-12 of copending Application No. 10/591,978, for reasons set forth in the previous Office Action.

No arguments were set forth regarding the provisional double patenting rejections, accordingly the rejections are maintained.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/022736 in view of JP60-122337, McGrath et al. (US 6,649,145), Bunkin et al., Aquarius, in further view of Honda Pumps, "Micro-Nano-Bubble generator built-in pump," <http://www.hondakiko.co.jp/english/microbubble/index.html>, 1999.

The invention is directed to a method of producing a solution comprising nanobubbles having a bubble diameter of 200 nm or less being surrounded by ions at the gas-liquid interface whereby to stabilize the bubbles whereby the method of production includes applying physical irritation to microbubbles contained in a solution containing mineral ions and having an electrical conductivity of 300 $\mu\text{S}/\text{cm}$ to reduce the size of the same, wherein the nanobubbles remain in solution for at least one month.

WO 03/022736 discloses that the merit of water discharge in the product of an oxygenated water is that production and dissolution of the ozone take place at the same time (page 4, lines 10-13). It is disclosed that about 2 liters of an ozonated water with 6 mg/l concentration was produced (page 4, lines 15,16). It is disclosed that fine bubble can be produced by a bubble generator (page 9, lines 13-30). An apparatus is disclosed where the water discharge system has two electrodes insulated with at least

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one dielectric and an insulator body surrounding the metal electrodes, the water discharge system producing through a dielectric barrier discharge the ozone and ozonated water (Claim 1).

JP 60-122337 disclose the use of a rotation shaft with a screw blade which has thin holes to effect the ozone bubbles (claims, page 3, line 8 to page 4, line 16).

McGrath et al. discloses oxygen nanobubbles having a size of 20-30 nm which are prepared by flowing liquids over hydrophobic surfaces (Column 7, lines 43-55). It is disclosed that nanobubbles allow higher concentrations of oxygen to be achieved in the aqueous solution and that the solutions can be prepared with physiological saline (Column 7, lines 44-65).

Bunkin et al. disclose that submicrobubbles can be stabilized by ions and that these “bubstons” formed in water have a radii of approximately 1-10 nm (Page 208).

Aquarius discloses that a 1000 ppm solution of sodium chloride has an electrical conductivity of 1990 $\mu\text{s}/\text{cm}$ (Page 1).

Honda Pumps teaches that ultrafined ozone water (micro-nano-bubbles) reportedly lasts its bacteriostatic action longer than one month under an ambient temperature and atmospheric pressure.

WO 03/022736 disclose the production of ozone bubbles and ozonated water where a dielectric barrier is used to effect the ozone bubbles. The difference between WO 03/0227356 and the claimed invention is that WO 03/022736 does not expressly disclose the use of circulating screwblades which have holes to effect the bubbles or oxygen bubbles that are 200 nm or less, where the water has a salinity concentration

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corresponding to the claimed electrical conductivity, where the nanobubbles have an inorganic shell of electrolytes, where the electric conductivity of the aqueous solution reaches at least 300 $\mu\text{S}/\text{cm}$. However, the prior art amply suggests the same as JP 60-122337 disclose the use of a rotation shaft with a screw blade which has thin holes to effect the ozone bubbles and McGrath discloses that oxygen bubbles having a size of 20-30 nm can be prepared, physiological saline used as the carrier. Bunkin et al. disclose that submicrobubbles can be stabilized by ions and that these "bubstons" formed in water have a radii of approximately 1-10 nm and Aquarius discloses that a 1000 ppm solution of sodium chloride has an electrical conductivity of 1990 $\mu\text{S}/\text{cm}$. As such, one of ordinary skill in the art would have been motivated to modify the prior art as above with the expectation by use of the same that similar to ozone bubbles that oxygen bubbles would exhibit increased dissolution into the water and that the aqueous solution would have a salinity falling within the claimed range of 0.01% to 3.5% via the use of physiological saline, that the presence of the ions will stabilize the oxygen nanobubbles and that physiological saline will have a electrical conductivity which is greater than 300 $\mu\text{S}/\text{cm}$. Regarding the limitation that the nanobubbles remain in solution for one month, it is known in the art that nanoscale bubbles are capable of remaining in solution for one month as shown by Honda Pumps. Therefore, the claimed invention, as a whole, would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, because every element of the invention has been collectively taught by the combined teachings of the references.

Claims 1-5, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 03/022736 in view of JP60-122337, McGrath et al. (US 6,649,145), Bunkin et al., Aquarius, in further view of Honda Pumps, "Micro-Nano-Bubble generator built-in pump," <http://www.hondakiko.co.jp/english/microbubble/index.html>, 1999 and Yabe (US 2006/0054205).

The rejection over WO 03/022735, JP60-122337, McGrath, Bunkin and Honda is applied as above.

Regarding claim 10, it would have been further obvious to provide nanobubbles in the 100 nm diameter size range when the references are taken in view of Yabe.

Yabe teaches generation of nanobubbles by performing the electrolysis and applying the ultrasonic-wave vibration (paragraph 0022). Bubbles are used in cleaning applications, and bubbles of an about 100 nm diameter is expected to have a high cleaning speed (paragraph 0024). For example, industrial equipments are cleaned by the water comprising nanobubbles and an organism is cleaned by the water comprising nanobubbles. The water to be used is electrolyzed water, ionized alkaline water or acid water (paragraph 0026).

It would have been obvious to one of ordinary skill in the art at the time of the invention to optimize nanobubble size in order to achieve beneficial properties, such as optimized cleaning properties. One of ordinary skill in the art would have been motivated to do so, and would have had a reasonable expectation of success in doing so, because Yabe teaches that nanobubbles having 100 nm diameter have high cleaning speed.

Response to Arguments

Applicant argues on pages 5-7 of the Response that the invention has disclosed a method of generating long lifetime nanobubbles which is strongly electrically charged. Applicant asserts that the prior art bubbles have a half life of a few minutes to several hours depending on the method to make the bubble. Applicant argues that the nanobubbles of the claimed invention are stable for one month or more, and the fact that the bubbles remain stable for a long time means that they don't become the supply medium of the gas in water, therefore density of the dissolution gas is not supersaturated.

This is not found to be persuasive. It is well shown in the art that nanobubbles are capable of one month lifetime, as shown by Honda Pumps. The cited references meet the broadly claimed method steps of "applying physical irritation" to a solution comprising sodium/mineral ion, therefore the references meet the claimed method steps, and the Honda Pumps references supports feasible lifetime of the nanobubbles.

Conclusion

No claims are allowed at this time.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leah Schlientz whose telephone number is (571)272-9928. The examiner can normally be reached on Monday-Tuesday and Thursday-Friday 9 AM-5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Hartley can be reached on 571-272-0616. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael G. Hartley/
Supervisory Patent Examiner, Art Unit 1618

LHS